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The Jovian thermospheric response to solar wind shocks

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Abstract

Recent work presented in [1] emphasised the importance of incorporating time-dependence in magnetosphere-ionosphere-thermosphere coupling when simulating this aspect of the Jovian system. We extend their model by simulating the response of thermospheric heating and aurorae to multiple shocks in the solar wind, by employing a configurable magnetosphere model coupled to an azimuthally symmetric general circulation model. We compare the ensuing response of thermospheric heating and cooling rates, and the resulting auroral signatures of these transient compressions and expansions of the Jovian magnetosphere (up to 40 Jovian radii) over a period of a few Jovian rotations. We find that Joule heating is transported to equatorial latitudes albeit not in quantities able to significantly alter the equatorial neutral temperatures.

References

[1] Yates, J. N., Achilleos, N. and Guio, P.: Response of the Jovian thermosphere to a transient ‘pulse’ in solar wind pressure, Planetary and Space Sciences, 2014.